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Oil and the War

BY LOUIS E. FRECHTLING

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Oil and the War*

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PETROLEUM is a vital factor in the military and economic strategies of the powers now engaged in wars on three continents. The R.A.F. planes defending the British Isles depend on supplies of fuel and lubricants brought by tanker across the Atlantic through the German blockade. British bombing raids on Germany and occupied territories are directed at Nazi oil plants and storage depots. The German army, seeking oil, has taken over the Rumanian fields and now presses on toward the petroleum-producing areas in Iraq and Iran. In the Far East, Japan moves to the south, toward the Netherlands Indies whose oil resources, if annexed, would make the Nipponese empire independent of foreign supplies. It is hardly an exaggeration to say that, "to an extent unparalleled in history, the conflagration we are watching is a war fought *with* petroleum and *for* petroleum."¹

In the World War of 1914-18, possession by the Western powers of superior oil resources played an important part in the final outcome. Afterward, Lord Curzon stated that the "Allies floated to victory on a wave of oil."² Nations at war today are even more dependent on petroleum, for the character of warfare has undergone a revolutionary change. The internal combustion engine, whose military potentialities were only beginning to be understood in 1918, has been perfected and adapted to new machines of war for use on the ground—tanks, armored cars, tractors, trucks and motorcycles; in the air—pursuit, bombing and transport planes; and on and under the sea—motor torpedo boats and submarines. The number of these units in the fighting forces of the major powers is great.

*In preparing this report, the author has had the advice of Dr. Walter Levy of New York, N. Y., a petroleum economist, who recently arrived from London where he was head of the intelligence department of the Petroleum Press Bureau. Dr. Levy's comprehensive study on *Oil and War* will be published shortly.

1. Dr. R. E. Wilson, consultant on petroleum, Office of Production Management, and formerly chief of the Petroleum Products Division of the National Defense Advisory Commission; N.D.A.C. *Press Release*, November 13, 1940.

2. Address before the Inter-Allied Petroleum Council, London, November 21, 1918; quoted in Ludwell Denny, *We Fight for Oil* (New York, Knopf, 1928), p. 16.

Germany has from 10 to 20 *Panzerdivisionen*, each containing 425 to 475 tanks and 3,000 other vehicles.³ Before the war the *Reichswehr* was reported to have a transport park of 135,000 trucks, 40,000 motor cars, and 60,000 motorcycles.⁴ The Nazi air force has a strength at present of 17,000 to 32,000 planes.⁵ The American defense program calls for 286,000 motor vehicles, the number considered necessary for an army of 1,400,000,⁶ and an air fleet of 50,000 planes. The United States Navy, like all the navies of the world, employs fuel oil almost exclusively to fire the boilers of its ships.

These engines of war consume large quantities of fuel. A bombing plane, for example, requires 100 to 200 gallons of gasoline for each hour of flight. A single German motorized infantry division burns 15,300 gallons of motor fuel during each day's operations,⁷ and an American armored division requires 75,000 gallons per day.⁸ While the petroleum requirements of the fighting services must be met first in wartime, there remains a considerable demand for oil in non-military but essential activities—for land and sea transportation, lighting, industry and many other purposes.

Nearly all (95 per cent in 1939) of the liquid fuels, lubricants and related products are derived from natural petroleum which is drawn from underground deposits and separated into its constituent parts at refineries.⁹ Gasoline, the principal petroleum derivative, varies in several qualities, the most

3. Hanson W. Baldwin, *United We Stand* (New York, Whittlesley House, 1941), p. 227.

4. Max Werner, *The Military Strength of the Powers* (New York, Modern Age, 1939), p. 122, quoting the *Deutsche Wehr*.

5. Baldwin, *United We Stand*, cited, p. 322.

6. R. E. Wilson, "Petroleum and the War" (Paper presented before the American Association of Petroleum Geologists, Houston, Texas, April 3, 1941).

7. E. M. Friedwald, "Oil and the Axis," *Contemporary Review*, January 1941, p. 80.

8. Leonard H. Nason, *Approach to Battle* (New York, Doubleday, Doran, 1941), p. 90. Cf. F. A. Hessel, M. S. Hessel, and W. Martin, *Chemistry in Warfare: Its Strategic Importance* (New York, Hastings House, 1940), p. 73.

9. A non-technical explanation of oil production, refining, etc., may be found in Max W. Ball, *This Fascinating Oil Business* (New York, Bobbs-Merrill, 1940).

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important being resistance to premature explosion, or "knock," while under compression. This property is expressed in octane numbers;¹⁰ aviation motors can operate on 70 octane fuel, but American planes require 87 to 100 octane gasoline. Crude oil also yields kerosene, used as a tractor fuel; light fuel oils and diesel oils for heavy tanks, trucks, submarines, "pocket battleships," and motor ships; heavy fuel oils burned by naval and merchantships; and lubricating oils and greases.¹¹ In recent years, chemists have discovered processes for making explosive materials (toluene, glycerine and picric acid), synthetic rubber, and plastics from petroleum.¹²

Natural petroleum is the best and cheapest source of these products, but it is not distributed evenly over the earth. Some nations, seeking self-sufficiency, have developed means of producing substitutes for crude oil products. Germany, the leader in this field, utilizes extensively the Bergius process for making synthetic gasoline and fuel oils by hydrogenating coal and lignite. The Fischer-Tropsch method produces low octane gasoline and diesel oil by synthesizing coal gas. Substitutes are also obtained from shale oil beds found in Scotland, Estonia, Manchuria and elsewhere. Benzol, a by-product of coke-oven operations, and alcohol, made by fermenting vegetable matter,¹³ are extensively employed in Europe as motor fuel blends. Liquid fuels may be replaced completely by the use in car and truck motors of gases carried under compression in steel cylinders or produced in miniature gas generators called "gasogenes."¹⁴

When the second World War began in September 1939, none of the belligerents was self-sufficient in oil. Germany, through conquest and expansion of its synthetic oil industry, is now able to cover a large part of its requirements, but still relies on Russia for marginal quantities. Italy, controlling

almost no oil resources, must obtain its supplies from the Nazis. Some of Great Britain's petroleum-producing areas are endangered by Axis offensives and others are located in distant parts of the world, making the empire—and especially the United Kingdom—more dependent than ever on foreign imports. Japan is forced to draw on foreign fields for 65 per cent of the oil it consumes. Thus petroleum becomes both an object and an instrument of diplomacy, conditioning the foreign policies of the warring and non-warring nations alike.

THE BELLIGERENTS

GREAT BRITAIN

The oil resources of the British Empire are small, amounting to only 2.5 per cent of the world's production in 1940. The output of oil fields throughout the world on which Britain can draw, however, is very much larger. Through the giant oil trusts, the Anglo-Iranian Oil Company and the Royal Dutch-Shell, both of which are closely controlled by Whitehall,¹⁵ the British have secured important oil concessions in the Near East and Latin America. Since May 1940 Britain, through the Dutch government-in-exile, has been able to dispose of the production of the Netherlands East Indies, which raises Allied production to 224,749,000 barrels,^{15a} or 10.5 per cent of world output.

The Dominion of Canada produced 9,000,000 barrels of oil in 1940, principally from the Turner Valley fields in Alberta. The amount is rising rapidly,¹⁶ but for the near future Canada must depend on imports from the United States and Latin America for over 80 per cent of its consumption. In the United States itself the Shell Union Oil Company, a Royal Dutch-Shell affiliate, is the country's third largest producer, with an output of 55,000,000 barrels a year,¹⁷ most of which is sold on

10. For a definition of octane numbers and a description of the confusion resulting from a multiplicity of rating systems, see U.S. Bureau of Mines, *Minerals Yearbook, 1940* (Washington, Government Printing Office, 1940), p. 100.

11. Over 200 products, including medicinal preparations, cosmetics, insecticides and fertilizers, are derived from petroleum. *Petroleum Facts and Figures* (5th ed., New York, American Petroleum Institute, 1937), list opposite p. 108.

12. Hessel, *Chemistry in Warfare*, cited, pp. 125-30. R. E. Wilson, "New Jobs for Petroleum," *Science Digest*, January 1940, pp. 75-79; J. Stokley, "Oil for Defense," *Science News Letter*, November 7, 1940, pp. 298-300.

13. A bushel of wheat yields 2 to 5 gallons of alcohol, a ton of grapes 15 gallons, and a ton of sugar beets 22 gallons. *Energy Resources and National Policy* (Washington, National Resources Committee, 1939), p. 333.

14. A clear, concise description of substitute motor fuels may be found in *Energy Resources and National Policy*, cited, pp. 317-37. See also H. E. Priester, *Das deutsche Wirtschaftswunder* (Amsterdam, Querido, 1936), pp. 130-44; Anton Luebke, *Das deutsche Rohstoffwunder* (2nd ed., Stuttgart, Verlag für Wirtschaft und Verkehr, 1938), pp. 233-54.

15. The United Kingdom government has owned a controlling interest in the Anglo-Iranian since 1914. Although Royal Dutch-Shell is technically a privately owned corporation registered in the Netherlands with its home office now at Batavia, it has long had close relations with the British government. E. V. Francis, *Britain's Economic Strategy* (London, Jonathan Cape, 1939), p. 135; E. H. Davenport and S. R. Cooke, *The Oil Trusts and Anglo-American Relations* (London, Macmillan, 1923), p. 19.

15a. The standard of measure used throughout this report is the U.S. barrel of 42 U.S. gallons. It is employed in the United States and in foreign oil fields where American interests are dominant. The European and Asiatic standard is the metric ton. Since the barrel is a measure of volume and the metric ton a measure of weight, the conversion factor varies with the specific gravity of the liquid. Roughly, a metric ton of crude oil equals 7 barrels, and a metric ton of gasoline 8.5 barrels. Conversion tables may be found in *Petroleum Facts and Figures* (7th ed.), cited, pp. 27-28.

16. "The Canadian Oil Supply," *Science*, March 14, 1941, supp., p. 8.

17. Production in 1938 was 53,236,000 barrels, or 4.4 per cent of the United States total. Temporary National Economic Committee, *Hearings*, Part 14-A (Washington, 1940), p. 779.

the local market, however. Latin America is the most important single area in Britain's oil strategy, furnishing the United Kingdom with 45 per cent of its oil imports in 1939. British companies have a virtual monopoly over production on the island of Trinidad, which reached 20,000,000 barrels in 1940 and continues to rise. About 75 per cent of the oil is exported to empire countries. Various British companies have substantial interests in the oil fields of Venezuela and Colombia, which together produce about 210,000,000 barrels annually. Most of the Venezuelan crude and about half of the Colombian is processed in the mammoth refineries located on Aruba and Curaçao islands in the Netherlands West Indies. Allied troops landed on these islands in June 1940 to protect the plants.

On the opposite side of the world, British interests have been strongly entrenched in the Middle Eastern fields for four decades. The Anglo-Iranian exploits almost exclusively the rich deposits in Iran. The principal producing areas are at Masjid-i-Sulaiman and Haft Khel, in the southwest part of the country. Oil is piped 120 miles to Abadan, an island in the Shatt-al-Arab 30 miles from the Persian Gulf. After refining in a huge modern plant, the finished products are shipped out by tanker. The Iranian government's attitude toward the company has been outwardly correct, but sometimes friction has occurred.¹⁸ In mid-1940 Shah Riza Khan Pahlevi demanded a revision of the concession, and the company agreed to establish a guaranteed minimum annual payment of £4,000,000, undoubtedly at the request of the British Foreign Office.¹⁹ Production of the Iranian fields has been held at approximately 78,000,000 barrels for the past four years, but could be expanded considerably on short notice. The Persian Gulf area, long a sphere of British influence, has become within the last ten years an important secondary source of oil, and in the future will probably be one of the world's major producing areas. On the Bahrein Islands, a British protectorate, a British-incorporated joint subsidiary of the Standard Oil Company (California) and the Texas Corporation exploits a small but rich field and operates a modern refinery. Opposite Bahrein, in Al Hasa province of Saudi Arabia, oil in considerable quantity has been located by another subsidiary of the two American companies.²⁰ To the westward, a subsidiary of the Royal Dutch-Shell

Company operates wells in several fields along the northern Egyptian coast of the Red Sea. The output of 6,000,000 barrels is refined at Suez and consumed largely in Egypt.

The Mosul oil fields of Iraq are operated by the Iraq Petroleum Company, owned by Royal Dutch-Shell, Anglo-Iranian, French and American interests (each 23.75 per cent), and an Armenian (5 per cent). From the fields around Kirkuk, pipelines were completed in 1934 to carry the oil to Mediterranean ports—531 miles to Tripoli, Syria, and 618 miles to Haifa, Palestine. The flow of oil through the Syrian branch was shut off in June 1940, while the southern branch continued to supply about 14,000,000 barrels annually to a new refinery at Haifa. In May 1941 production in the Mosul fields and pipeline operations were disrupted by the Axis-inspired attack of the Iraqi régime on the British.²¹

British India and Burma together produce about 55 per cent of their oil requirements, principally from fields along the Irrawaddy River.²² British and Allied territories in east Asia, however, can be supplied from the East Indies. Fields in the Netherlands East Indies, the world's fifth largest producer, are scattered over the islands, with Sumatra contributing three-fifths of the total. Up-to-date refineries process most of the crude oil and can produce aviation gasoline of highest quality. The industry is dominated by three large British-Dutch and American companies, whose activities and sales have been closely supervised by the Dutch government since May 1940. Britain directly controls oil production in Sarawak and Brunei, in northwest Borneo.

Thus London controls sources of petroleum in many parts of the world. Outlying empire territories can be provided with essential supplies by ocean transport over comparatively short distances—Canada from the Caribbean and the United States, the Near Eastern territories from Iran and Bahrein, the Far Eastern Dominions and colonies from the East Indies. The United Kingdom alone is in an exposed position. It produces no crude oil and small amounts of petroleum substitutes—3,000,000 barrels of synthetic oil, benzol and alcohol, and 700,000 barrels from Scottish shale deposits.²³ The entire output of substitutes in 1937 was equal to 7 per cent of the consumption of motor fuel and

18. M. Nakhai, *Le Pétrole en Iran* (Paris, Paul Guethner, 1938), *passim*.

19. The highest annual payment in the past was £3,545,000. *The Economist*, August 31, 1940, p. 288; "The Struggle for Oil," *Labour Research* (London), October 1940, pp. 153-55; *Deutsche Bergwerks-Zeitung*, September 3, 1940.

20. Oil installations both on Bahrein and the mainland were ineffectively bombed by Italian planes on October 19, 1940. *The New York Times*, October 21, 1940.

21. "Oil in the Middle East," *The Economist*, August 31, 1940, pp. 283-84; L. Vecchia Vaglieri, "Il petrolio nel Vicino Oriente," *Oriente Moderno*, January 1941, pp. 1-24; M. Boveri, *Minaret and Pipeline* (New York, Oxford University Press, 1939), pp. 222-39.

22. G. M. Lees, "The Search for Oil," *Geographical Journal*, January 1940, p. 14; Sir L. L. Fermor, "Burma's Mineral Resources and the War," *Asiatic Review*, January 1941, pp. 158, 161-62.

23. *Energy Resources and National Policy*, cited, pp. 319-22, 326.

WORLD OIL PRODUCTION

PRODUCTION OF CRUDE PETROLEUM 1940

	'000 bbls. ¹	Per cent of world production	Rank in world production	REFINING CAPACITY 1940 ² '000 bbls.	EXPORTS 1940 ³ '000 bbls.	PRODUCTION OF PETROLEUM SUBSTITUTES 1939 ⁵ '000 bbls.
British and Allied Control	224,749	10.48	.....	521,752	.....	13,506
United Kingdom	.....	.....	.....	43,838	.....	6,330
Canada	8,955	.42	13	72,877	.....	3,000
Trinidad	20,219	.93	11	26,050	19,000 ⁴	250
Netherlands West Indies	.....	.....	.....	165,892	.....	.....
Egypt	6,053	.28	16	5,585	.....	160
Iraq	25,725	1.21	9	1,314	23,000 ⁴	.....
Palestine	.....	.....	.....	13,140	.....	.....
Iran	78,592	3.68	4	109,390	60,000 ⁴	1,000
Bahrein Island	7,095	.33	15	10,676	5,700 ⁴	.....
British India	2,250	.09	21	12,514	.....	150
Burma	7,979	.37	14	.....	6,300 ⁴	.....
Sarawak and Brunei	7,047	.33	16	6,570	6,600 ⁴	160
Netherlands East Indies	60,830	2.84	5	52,560	47,330	2,000
Australia	4	.....	31	1,346	.....	456
German Control	51,988	2.42	.....	152,031	.....	24,613
Germany	4,544	.21	18	15,916	.....	20,160
Austria	719	.03	26	2,634	.....	.....
Czechoslovakia	119	.....	28	4,040	.....	.....
France	496	.02	27	49,784	.....	3,498
Hungary	1,755	.08	22	3,833	.....	80
Poland (German)	1,124	.06	25	2,175	.....	75
Rumania	43,231	2.01	6	73,649	28,500 ⁴	800
Italian Control	1,716	.08	23	18,823	.....	631
Italy	57	.....	30	18,823	.....	631
Albania	1,659	.08	24	.....	.....	.....
Japanese Control	2,639	.12	.....	18,264	.....	4,996
Japan	2,639	.12	20	17,279	.....	3,996
Manchuria	.....	.....	.....	985	.....	1,000
Non-belligerent	1,864,798	86.87	.....	1,782,099	.....	64,206
U.S.A.	1,351,847	62.99	1	1,465,477	115,880	57,336
Mexico	40,350	1.88	7	32,784	20,551	1,000
Venezuela	184,761	8.61	3	25,072	157,117	1,000
Colombia	26,067	1.21	8	4,763	22,314	700
Ecuador	2,349	.11	21	771	1,600 ⁴	80
Bolivia	110	.....	29	238	.....	.....
Peru	13,427	.63	12	7,227	11,000 ⁴	1,100
Argentina	20,846	.95	10	30,954	700 ⁴	450
Saudi Arabia	5,365	.25	17	.....	.....	.....
U.S.S.R. Proper	212,909	9.92	2	209,418	6,750 ⁴	1,215
Poland (Russian)	2,767	.13	20	5,395	.....	25
Estonia	.....	.....	.....	.....	.....	1,300
Sakhalin	4,000	.19	19	.....	2,000 ⁴	.....
WORLD TOTAL	2,146,105	.....	.....	2,518,547	.....	108,120

1. From *Petroleum Facts and Figures* (7th ed.), p. 16.

2. Practical capacity after deducting 10 per cent for repairs, cleaning, etc. See E. G. Nourse, *America's Capacity to Produce* (Washington, Brookings Institution, 1934), pp. 91-93. Based on daily capacity statistics in *Oil and Gas Journal*, December 26, 1940, pp. 93-103.

3. From *International Petroleum Trade*, unless otherwise indicated.

4. Estimate.

5. Based on preliminary estimates of V. R. Garfias and R. V. Whetsel in *World Production of Petroleum Substitutes* (New York, American Institute of Mining and Metallurgical Engineers, 1941), Technical publication No. 1274. Includes natural gasoline, synthetic gasoline from coal, benzol, alcohol, liquid gas, methane, manufactured gas and producer gas used as motor fuels, and shale oil products. Statistics vary in some cases from those used in the text.

negligible proportions of other products. The Committee of Imperial Defense considered in 1937 the advisability of establishing a large-scale synthetic oil industry as a defense measure, but decided that "in general the policy of depending on imported supplies with adequate storage is the most reliable and economical means of providing for an emergency."²⁴ Since the beginning of the war, the government has been urged to utilize domestically produced motor fuels more extensively. Some gasolines have been placed in operation and other fuel sources tapped, but the total effect cannot be important. Britain lacks technicians in this field and its heavy industry is already occupied with other tasks.²⁵

The United Kingdom, therefore, depends on imports to meet almost all its requirements, which in pre-war years amounted to about 90,000,000 barrels. Wartime consumption is a state secret, and all figures must be accepted with reserve. Some generalizations can, however, be made. In the last decade, military experts predicted that great powers engaged in war would require two or three times their normal consumption of petroleum. These estimates were based on the assumption that armed forces employing thousands of tanks and guns would engage in combat on a scale, both in area and time, comparable to that on the Western Front in 1917-18. Instead, in the present war there have been long periods of inaction, punctuated by short, swift campaigns in which relatively small numbers of units were involved. Petroleum consumption has shown no such spectacular rise as in the last war, when the Allies expended almost three times their peacetime supplies on the Western front alone.²⁶ The United Kingdom did have to provide for its expeditionary force in the Battle of France, but since that time the principal requirements have been for bombing planes, naval and merchant vessels, and comparatively small armies in North Africa and Greece. On this basis, it can be assumed that military consumption was approximately 50,000,000 barrels. Civilian consumption has been cut considerably, although Britain's dependence on motor transportation probably prevents a decrease of more than 50 per cent, or 45,000,000 barrels. The requirements of the United Kingdom, therefore, are about 95,000,000 barrels, of which over 95 per cent must be imported.²⁷

24. Committee of Imperial Defense, Sub-Committee on Oil from Coal, *Report* (Cmd. 5665, London, H.M. Stationery Office, 1938).

25. *The Economist*, November 30, 1940, p. 680; January 18, 1941, p. 84.

26. Consumption in the United Kingdom, France and Italy in 1913 was about 23,000,000 barrels, while the Allied armies in France needed 60,000,000 barrels in 1918. See "Petroleum in Two Wars," *Petroleum Press Service*, April 1941, pp. 37-39.

During the early part of the war, the United Kingdom took its oil imports principally from fields located in countries within the sterling bloc or controlled by British companies.²⁸ With the closing of the Mediterranean to British shipping and the growing pressure on available tankers, the British Isles have become almost completely dependent on oil from the Americas. The Lease-Lend Act assures Britain of adequate supplies of oil on this side of the Atlantic. The crucial problem, however, is shipping. As 1940 opened, Britain had 436 tankers with a gross tonnage of 3,167,575.²⁹ Most of the Norwegian tanker fleet of 2,060,575 tons, a portion of the Dutch and Danish fleets, and three tankers from the United States³⁰ brought the total to almost 6,000,000 tons. Tanker losses have been very high, however, and the carrying power of the remaining vessels is reduced by the convoy system and delays in unloading. Britain appears to be approaching the operational minimum and must look to America for more aid.

GERMANY AND ITALY

Germany's approach to the oil supply problem is in marked contrast to that of Great Britain. A cardinal principle of the National Socialist doctrine of *Wehrwirtschaft* is that the state must secure control over adequate sources of raw materials within its own borders. When Hitler came to power in 1933, Germany produced about a fourth of its oil requirements and depended on imports, largely from outside Europe, for the remainder. Officials of the Ministry of Economics almost immediately laid down a program designed to make the Reich independent of foreign sources of oil.

The production of crude petroleum in Germany in 1933 was only 1,700,000 barrels. The government encouraged a thorough search for oil, taking over control of all wells in January 1935.³¹ Eighteen new fields were located near Hamburg and Hanover and in Holstein, and the output was raised

27. Consumption figures in this report are based on a report on "World Consumption of Petroleum and its Substitutes in 1940," prepared by V. R. Garfias, R. V. Whetsel and J. W. Ristori, Cities Service Co., New York. The United Kingdom imported 92,400,000 barrels of oil in 1938 and 86,500,000 barrels in 1939. *International Petroleum Trade*, April 30, 1941, pp. 108-109.

28. Sources of United Kingdom petroleum imports in 1939 were: Netherlands West Indies, 29.84 per cent; United States, 21.73; Iran, 19.15; British West Indies, 8.06; Venezuela, 6.9; Iraq, 4.12; Rumania, 2.87; other, 7.33. *Ibid.*

29. Statistics relate to ocean-going tankers of 2,000 gross tons and over, as of January 1, 1941. U.S. Maritime Commission, Division of Research, *Special Report No. 2958*.

30. U.S. Maritime Commission, *Statement Showing Vessels Approved for Transfer to Foreign Ownership and/or Registry, October 26, 1939 through October 25, 1940, and Press Releases*.

31. The area explored was increased from 3,088 square miles in 1934 to 34,800 in 1938. J. de Carency, "Germany's Oil Problem," *Free Europe* (London), August 9, 1940, p. 137.

to 4,500,000 barrels annually at the outbreak of the war. Most of the oil is refined at Hamburg and Hanover, with lubricating oil the most desired product. The incorporation of Austria in 1938 brought a rapidly expanding oil industry under Berlin's control, and Nazi engineers have continued to increase production, which stood at 700,000 barrels per year in September 1939. The oil fields of Czechoslovakia, annexed in March 1939, are small, and the output has been raised only slightly above the pre-war level of 120,000 barrels.

Far more spectacular and significant are the advances made by the Germans in the realm of synthetic oil production. Realizing that central Europe apparently could not produce enough crude oil for their needs, the Nazis remedied the defect by a *tour de force* of science and engineering—the manufacture of large quantities of oil from coal and lignite, which Germany produces in abundance. In a free economy these products could not compete with petroleum derivatives, since the cost of production is considerably higher,³² but the government was determined to reorient industry toward autarchy, no matter what the cost. Initially, Bergius hydrogenation plants were built in the Ruhr Valley and Saxony, and later in areas farther removed from the western border.³³ Recently the trend has been toward Fischer-Tropsch plants, which can be constructed in smaller units and therefore are less vulnerable to bombing. The government also encouraged the production of benzol and power alcohol for motor fuel. In 1939, 4,300,000 barrels and 1,554,000 barrels respectively were employed for blending with gasoline. Further economy in the consumption of petroleum products was achieved by the construction of gasogenes and by the utilization of compressed gases as motor fuels. Altogether, the production of synthetic oils and substitutes in the Reich at the outbreak of the war was 24,000,000 barrels annually.³⁴ While production was rising, Germany increased its imports of foreign oil, which were at the rate of 37,800,000 barrels in 1939. Since the Reich's consumption in

the last pre-war year was 55,000,000 barrels,³⁵ it is apparent that large stocks of oil, which amounted to 50 per cent of peacetime consumption, were accumulated.³⁶

Germany's oil supplies at the outbreak of war were much more adequate than British and Allied spokesmen believed. It was confidently predicted that the blockade would deprive the Nazis of essential imports, while aerial bombing of storage depots and oil plants would hasten oil starvation in the Reich. The continued successes of the German army indicate that the predictions were based on false assumptions. Wide errors were made in estimating consumption, which was much lower than expected. Civilian supplies were closely rationed and severely cut; private motor car use, for example, was reduced by 80 per cent. Wherever possible, traffic was diverted from the roads to railways and rivers. As soon as the Nazis occupied an area, they immediately reduced its consumption to 20 or 25 per cent of normal—apparently the minimum below which the conquered territory ceases to contribute to Germany's new economic order. Meanwhile, military consumption has been less than most experts predicted. Campaigns have been short,³⁷ and oil requirements surprisingly low—probably 2 to 3 million barrels in Poland and 10,000,000 barrels in the Battle of France. German oil fields, refineries and synthetic oil plants appear to have suffered much less from bombing than British reports would indicate. Although oil installations are special objectives of R.A.F. flights³⁸ and some damage has been done, the best evidence indicates that the overall petroleum supply has been cut only 10 or 15 per cent.³⁹

Nazi conquests have brought under Berlin's control virtually all the known oil production of continental Europe (excluding the U.S.S.R.). When Poland was partitioned by Germany and Russia on September 28, 1939, the Reich obtained the Jaslo fields, undamaged by war or sabotage. Although the output was only 1,214,000 barrels in 1939, German engineers have been able to expand production

32. The cost of synthetic fuels in England was estimated to be two or three times that of imported petroleum products; "Europe's Liquid Fuel Supplies," *Bulletin of International News*, October 5, 1940, p. 1274. See also *Energy Resources and National Policy*, cited, pp. 321, 330-31.

33. The larger hydrogenation plants are:

Plant	Started Production	Estimated output '000 bbls.
Leuna (Merseberg)	1927	3,000
Schwarzheide (Saxony)	1937	1,500
Zeitz (Saxony)	1937	1,500
Gelsenkirchen	1939	2,250
Politz (Stettin)	1940	2,625
Brux (Czechoslovakia)	1941	4,500(?)

Based on "Europe's Liquid Fuel Supplies," cited, p. 1270.

34. Wilson, "Petroleum and the War," cited, p. 10.

35. Garfias, "World Consumption of Petroleum," cited.

36. Estimates of German stocks in September 1939 vary widely. See E. De Golyer, "Petroleum in Two World Wars" (Paper presented before the National Petroleum Association, Cleveland, April 24, 1941), p. 7.

37. Major campaigns include that in Poland of 28 days; Low Countries and France—43 days; and Yugoslavia and Greece—23 days.

38. The R.A.F. in 20 months of war has directed 330 raids at oil plants, including 43 on Gelsenkirchen (synthetic oil plant) and 33 on Hanover (refineries). British Press Service, *Release*, May 1, 1941.

39. Wilson, "Petroleum and the War," cited, p. 14.

40. *Oil und Kohle*, December 1, 1939, translated in *International Petroleum Trade*, January 31, 1940, p. 27; *Bulletin of the Imperial Institute* (London), April-June 1940, p. 244.

considerably.⁴⁰ The French zone occupied by the Nazis under the armistice of June 1940 contains an old field at Pechelbronn, Alsace, producing 500,000 barrels a year. When Hungary joined the Axis in November 1940, its young and vigorous oil industry came under Nazi control. Hungary's oil, produced by a subsidiary of Standard Oil of New Jersey, was consumed locally, but now may be diverted elsewhere. With increased production in the old Reich, Austria and Czechoslovakia, Germany's output of crude oil is now over 9,000,000 barrels annually. At the same time, synthetic fuel production has been raised to almost 30,000,000 barrels a year by the construction of new plants.⁴¹ The U.S.S.R. has been exporting oil to Germany at the rate of 7,000,000 barrels annually since the beginning of the war,⁴² and shipments from Rumania were about 7,000,000 barrels during the first year of the European conflict.⁴³

By September 1940 the Reich was able to cover most of its own consumption by domestic production and imports. For the remainder, it was forced to draw on stocks replenished by the seizure of perhaps 20,000,000 barrels in the Netherlands, Belgium and France. These stocks, however, cannot be replaced. The Nazis therefore turned to Rumania as the closest available source of petroleum. German diplomatic pressure had forced the Bucharest government to agree in December 1939 to furnish 13,000,000 barrels of petroleum products to the Reich in 1940. The engagement was not fulfilled because of obstructions raised by the Allied governments and their oil companies in Rumania, and because of transport difficulties. The Rumanian government attempted to accede to Berlin's wishes by instituting state control over the oil industry which was completely established by late summer of 1940. The transportation problem, however, defied solution. From the principal fields and refineries around Ploesti, north of Bucharest, 66 per cent of the oil in 1939 was dispatched by pipeline and rail to Black Sea ports and thence by tanker, while 29.7 per cent was sent to Giurgiu on the Danube and loaded into river barges.⁴⁴ Diversion of exports on the scale demanded by Germany was impossible, since rail and river transport facilities toward Germany were deficient.⁴⁵ Acting indirectly, the Nazis gradually obtained domination over Rumania, which was completed in October 1940. German engineers appeared at once in the oil fields and expect to

check the decline in Rumanian production, which stood at 46,000,000 barrels in 1939. The crucial problem, however, is still transportation and not production. By pressing every available tank car and barge into service, the Nazis are able to move 11,000,000 barrels a year to the Reich. Construction of additional pipelines in Rumania and of railways and barges will gradually increase exports to the west.^{45a}

Rumanian oil is also the principal source of supply for Italy, whose oil position is far weaker than that of its Axis partner. Small amounts of crude oil are produced in Italy, and Albania contributes 1,700,000 barrels of inferior oil from the fields at Devoli, apparently undamaged by the Greek invasion. The Fascist synthetic oil industry is in its infancy, and lacks sufficient coal. Italy cannot lower its consumption below the peacetime level of 21,000,000 barrels, even with severe restrictions on civilian purchases. The annual deficit of at least 18,000,000 barrels has been met since Italy entered the war by drawing on large stocks. The stores of oil are already near exhaustion, and the Fascist government, having expected to win the war in a few months, is now dependent on Germany for almost all of its supplies.⁴⁶

The Reich is not facing actual oil starvation and will not be crippled in the immediate future by a deficiency of oil supplies for the armed forces and industry. Its requirements of approximately 55,000,000 barrels are just covered by production in Western Europe of synthetic and crude oils amounting to 37,000,000 barrels and by imports from Rumania and Russia totaling 17,000,000 barrels. Domestic consumption may be further reduced in order to assure the army and air force of vital supplies. Only 30,000,000 barrels of Rumanian oil are left, however, to provide Italy and the occupied territories with oil. Since their peacetime requirements are over 80,000,000 barrels, industrial production and distribution must be severely curtailed. The Nazis cannot hope to organize successfully the continent's economy without additional oil resources. It is not an immediate need, therefore, which may have dictated the recent German drive toward Iraq and Iran, but the desire to secure adequate supplies for the new German empire in Europe.⁴⁷

41. *Moniteur du Pétrole Roumain*, 1940, pp. 124-25, quoted in *World Petroleum*, April 1941, pp. 124-25; De Golyer, "Petroleum in Two World Wars," cited, p. 6.

42. See p. 80.

43. Wilson, "Petroleum and the War," cited, p. 15.

44. Petroleum Press Bureau, April 26, 1940, p. 194.

45. *Ibid.*, pp. 194-95; February 1941, pp. 14-15.

45a. "Petroleum Investigation," *Hearings before a Subcommittee of the Committee on Interstate and Foreign Trade, House of Representatives*, 77th Congress, 1st session (Washington, Government Printing Office, 1941), statement of R. E. Wilson, p. 9.

46. J. A. Kronstein, "Italy's Oil Problem," *Free Europe*, December 27, 1940, p. 86, and January 10, 1941, p. 104.

47. Wilson, "Petroleum and the War," cited, p. 21; "Is Nazi Europe Short of Oil?" *The Economist*, January 25, 1941, pp. 117-18; "Europe's Liquid Fuel Supplies," cited.

JAPAN

Japan's oil policy, closely resembling that of Germany, has a similar objective—possession of adequate sources obtained either by developing a domestic industry or securing control over foreign fields. The Japanese have not, however, made as much progress as the Nazis, and therefore draw on distant producers for 65 per cent of their annual consumption.

The threat of sanctions during the Manchurian incident of 1931-33 led Tokyo to examine carefully its oil supply, and in 1934 the Petroleum Industry Law was passed, the first in a series of measures designed to strengthen the empire's position.⁴⁸ An intensive drilling campaign throughout the yen-bloc has resulted in the discovery of a few additional oil sources, increasing production only slightly from 2,249,000 barrels in 1935 to 2,639,000 barrels in 1940. Recent discoveries of oil at three places in Manchuria and Inner Mongolia have raised hopes of a large industry there, but actual exploitation will not be possible for some time.⁴⁹ The Five-Year Plan, launched in 1937, for the production of synthetic fuels is meeting with somewhat more success. Oil produced from shale beds at Fushun, Manchuria, reached about 3,150,000 barrels in 1940.⁵⁰ The impressive program for production of synthetic fuels from coal calls for an output of 26,000,000 barrels (3,700,000 tons) in 1942. Synthetic oil has been made experimentally since 1936, and commercially since 1939. Twelve plants in Japan proper, five in Manchuria, two each in Sakhalin and Korea are built or under construction. Some of the installations using a Japanese modification of the Bergius process can produce 82 octane gasoline without the addition of tetra-ethyl lead.⁵¹ The program has been retarded by the disruption of machinery shipments from Germany and by coal shortages, in spite of which about 8,000,000 barrels were produced in 1940 and over 10,000,000 this year.⁵² The govern-

ment encourages the manufacture of alcohol from sugar cane and potatoes; about 500,000 barrels were used as motor fuel in 1940. As a further protection against oil sanctions, Japan has set up refineries and cracking plants capable of producing over half of the gasoline required and most of the lubricating oil. Aviation fuel and tetra-ethyl lead are made in plants utilizing American machinery and processes.⁵³

The consumption of petroleum products in Japan and Manchuria in 1940 was from 40 to 45 million barrels, of which 25,000,000 represents civilian consumption and the remainder military and naval requirements.⁵⁴ Domestic production of all types of oil was about 15,000,000 barrels, leaving a deficiency of at least 25,000,000 barrels, which was more than covered by imports from abroad. Japan's nearest source of petroleum is in the Russian half of Sakhalin Island. By a concession granted in 1925, a Japanese navy-controlled company obtained a share in the exploitation of the Sakhalin fields. Production on the Japanese-leased lands has hitherto been retarded by the obstructive tactics of Soviet officials, a reflection of Russo-Japanese antipathy in the Far East. As a result, the Japanese pumped only about 2,000,000 barrels in 1940, or half the island's output.⁵⁵ Far more important are the supplies of oil obtained from sources controlled by the United States and Great Britain. Exports from the United States were 24,600,000 barrels in 1940, of which a large portion was in gasoline up to 87 octane. The Japanese can, in fact, obtain all but the highest quality aviation fuel from the California fields. The other major source of Japanese oil imports is the Netherlands East Indies, whence about 9,000,000 barrels was sent to Japan in 1940.⁵⁶ The Japanese government enunciated in mid-1940 a new policy of economic collaboration between Far Eastern countries in a "greater East Asia co-prosperity sphere." In accordance with this program, Tokyo

48. G. C. Allen, *Japanese Industry: Its Recent Development and Present Condition* (New York, Institute of Pacific Relations, 1941), p. 20; E. B. Schumpeter, ed., *The Industrialization of Japan and Manchukuo, 1930-1940* (New York, Macmillan, 1940), pp. 433-39.

49. *Oel und Kohle*, September 15, 1940, quoted in *International Petroleum Trade*; J. R. Stewart, "First Well Stimulates Search for Oil in Manchuria," *Far Eastern Survey*, October 23, 1940, pp. 252-53; "Japan Seeks N.E.I. Oil for 'Co-Prosperity Scheme,'" *Oil and Gas Journal*, December 26, 1940, p. 82; *Far Eastern Survey*, March 26, 1941, p. 60.

50. Planned production of oil from shale is 3,500,000 barrels at the end of 1941 and 7,000,000 at the end of 1943. Reserves of shale estimated at 5,000,000,000 tons are available. J. R. Stewart, "The Yen-Bloc Supply Base in Practice," *Far Eastern Survey*, May 22, 1940. See also *The Heavy Industry of Manchukuo* (Tokyo, Japan Economic Federation, 1940), p. 4.

51. Schumpeter, *Industrialization of Japan*, cited, pp. 435-38.

52. Conjectural figures based on Schumpeter, *loc. cit.*; "Japan Seeks N.E.I. Oil," p. 83.

53. "Japan Seeks N.E.I. Oil," cited, p. 82.

54. V. R. Garfias estimates Japan's total consumption at 46,000,000 barrels in 1938 and 40,000,000 in 1939. "Petroleum Embargo Would Cripple Japan," *Oil and Gas Journal*, August 31, 1939, pp. 23-24.

55. K. Barnes, "Sakhalin Concessions Again Create Tension," *Far Eastern Survey*, August 16, 1939, p. 206; H. Moore, "Soviet Far Eastern Policy," *ibid.*, March 12, 1941, p. 41; M. J. Ginsbourg, "Oil and Diplomacy at Saghalien," *Far Eastern Review* (Shanghai), March 1940, pp. 110-12.

56. Dutch statistics indicate only the first destination of oil exports, most of which are transhipped through Singapore and various islands in the Gulf of Singapore and off Sumatra. Thus, while only 1,982,000 barrels were exported directly to Japan in 1939 (*International Petroleum Trade*, April 30, 1940, p. 148), much larger quantities ultimately reached Japan. The 1940 estimate is based on calculations of the Chinese Council for Economic Research, *World Exports to Japan Essential for War Purposes* (Washington, 1940), appendix 1, and of De Golyer, "Petroleum in Two World Wars," cited, p. 8.

compelled Batavia to sign an agreement on November 12 providing for the export of petroleum products to Japan at an annual rate of 13,800,000 barrels.⁵⁷ The agreement, made with the approval of the British and Dutch governments for six months,⁵⁸ was renewed in May 1941. Japan also received a million barrels of oil from Iran in 1940, but it is not known whether the contract was renewed. Small additional quantities are furnished to Japan from British Borneo. Altogether Japan imported 35,000,000 barrels in 1940 which, added to domestic production of 15,000,000 barrels, provided the empire with at least 5,000,000 barrels above apparent consumption. Undoubtedly the surplus in 1940 as in earlier years went into storage, and it is estimated that Japan now has at least a half-year's supply in stocks.

Tokyo has been able to force Britain and the United States to sell oil by threatening to strike at the East Indies if an embargo is applied. Washington and London appear to agree on the wisdom of propitiating the Japanese by furnishing them with sufficient oil to meet or more than meet their needs. If, in the future, the Western powers force a showdown in the Orient, a blockade of oil supplies would not immediately hamper the Japanese fighting forces. By drawing on stored oil and increasing local output to perhaps 20,000,000 barrels, the empire might engage in war for at least a year.⁵⁹ Meanwhile the Japanese, now only 600 miles from Borneo, would attempt to seize the oil fields in the East Indies. There Japan could obtain and ship out in its own tankers⁶⁰ enough oil to cover its requirements. If, on the other hand, Dutch and British resistance held up the Japanese, and the oil wells and refineries were blown up, it would take at least a year and probably longer for the Japanese to begin exploiting the fields.

THE NON-BELLIGERENTS

THE AMERICAS

Nations possessing 87 per cent of the world's production of crude oil are outside the theater of war. All the belligerents are dependent on them in some degree for oil supplies, and their oil export policies are therefore of great significance in determining the course of the war.

The United States, strategically located in the

57. *Department of State Bulletin*, November 16, 1940, p. 432.

58. Statement of Foreign Undersecretary, House of Commons, November 26, 1940; *Manchester Guardian Weekly*, November 29, 1940.

59. See E. B. Schumpeter, "The Problem of Sanctions in the Far East," *Pacific Affairs*, September 1939, pp. 259-62.

60. Japan was reported to have 47 tankers of 440,487 gross tons on January 1, 1940. (U.S. Maritime Commission, *Special Report No. 2958*, cited.) Observers believe that considerable tanker tonnage has been added recently.

North Atlantic, producing twenty times more oil than all of Axis Europe, and possessing the world's second largest tanker fleet, is the most important factor in the oil economies of both the British and Japanese empires. Ample supplies of petroleum products for export have been available in the past, and although the rearmament program will increase America's domestic demands by 8 or 9 per cent this year, the oil industry can easily expand the production of its wells by 30 per cent. Refinery output can be increased 25 per cent without new construction. Even the production of 100 octane gasoline can be doubled by utilizing existing plants, and additional capacity is under construction.⁶¹ The British Empire has first claim on American exports, which may be furnished under the Lease-Lend Act. Thus far, however, Britain has drawn more heavily on the Caribbean fields. America's principal contribution lies in the field of transportation. As Britain's available tank-ship tonnage fell, tankers owned by American oil companies were transferred to foreign registries, particularly Panamanian, thereby enabling them to enter war zones barred to American flag ships by the Neutrality Act.⁶² The tanker shortage continues, and on May 1, 1941 the Maritime Commission ordered 50 American tankers to transport Caribbean and Gulf Coast Oil destined for Britain as far as northeast coast ports, thereby shortening the routes of British ships by a fourth. Further diversion of American tankers would produce a major disruption of domestic supply, particularly along the North Atlantic coast.⁶³

The United States has sold at least 25,000,000 barrels of oil a year to Japan during the past three years, and exports for 1941 continue at that rate. Since the beginning of the China incident in 1937, organized groups have demanded an embargo on oil shipments to Japan. Pressure was increased in 1940 when it was feared that American oil sent to Japan would reach the Axis powers in Europe. Although the Administration, acting in concert with

61. "Petroleum Investigation," cited, pp. 3-5; J. C. deWilde and George Monson, "Defense Economy of the United States: An Inventory of Raw Materials," *Foreign Policy Reports*, November 15, 1940, pp. 202-204.

62. The tanker fleet of Panama numbered 64 vessels of 551,629 tons on January 1, 1941. Since then, 12 American vessels of 80,384 tons have been transferred to Panamanian registry. U.S. Maritime Commission, *Special Report No. 2958*; *Statement Showing Vessels Approved for Transfer*, cited; *Press Releases*. Almost all the tankers are controlled by American companies.

63. Of the 365 privately owned United States tankers, 312 were engaged in coastwise shipping in early 1941. U.S. Maritime Commission, *Report on the Employment of American Steam and Motor Merchant Vessels . . .* (Report No. 300, 1941). The northeastern United States depends on tanker-borne oil for 95 per cent of its requirements. U.S. Congress, House of Representatives, *Petroleum Investigation—Pipeline Transportation Related to National Defense* (77th Congress, 1st Session, Report No. 602, 1941).

the British, has refused to impose an embargo, it has yielded to a limited extent to public demand by preventing the export of specified products. Under the Export Control Act of July 2, 1940, the President has subjected to license the export of aviation gasoline above 87 octane, aviation lubricating oil, tetra-ethyl lead, equipment and plans for the manufacture of these products, refining and well-drilling machinery and oil drums.⁶⁴ Licenses have been refused for exports of these products to Japan, thus imposing in effect an embargo. But the Japanese already have information and plants for manufacturing aviation fuels and lubricants from imported crude oil, and meanwhile are satisfied to purchase aviation gasoline under 87 octane, which is adequate for their planes.⁶⁵

The United States has also exported about a million barrels of motor fuel yearly to Russian Asia.⁶⁶ British officials have suggested that this oil ultimately reaches Germany, but it is almost certainly consumed in the Far East.^{66a} Refineries in that area cannot produce high quality gasoline, and it is cheaper to bring fuel by water from California than by rail across Siberia. It must be admitted, however, that imports from the United States do relieve very slightly the pressure on Russia's oil industry. The licensing system has prevented Russia from obtaining aviation gasoline over 87 octane here and has also stopped purchases of well-drilling machinery, which took a sudden rise late in 1940.⁶⁷

Oil production and marketing in Latin American countries is almost wholly in the hands of British, Dutch and American companies. Their exports with slight exceptions, have gone to British Empire and Allied territories, or to the United States. Mexico, which divested its oil industry of foreign control by expropriating it in 1938,⁶⁸ was boycotted by British and American companies during 1938 and 1939. Mexican oil was then shipped to Germany, Italy and Japan, mostly under barter agreements.⁶⁹ The war suspended trade with the

first two countries and, since Anglo-American purchasers are again in the market, very little oil is going to Japan.⁷⁰

THE U.S.S.R.

Russia is the world's second largest producer of crude oil and the only major power beside the United States which normally covers its petroleum consumption from domestic sources. Seventy-five per cent of Russia's oil is pumped from the fields around Baku, on the western coast of the Caspian Sea, and 17 per cent more from the Grozny and Maikop fields on the northern slopes of the Caucasus Mountains.⁷¹ Some of the oil is transported across the Caucasus by three pipelines which terminate at Black Sea ports, thence by tanker and barge to the large industrial areas of Western Russia.⁷² The Caucasian oil is also carried by tank-car and river barge to the consumption centers to the north and west. Increasing in importance are the rich oil-bearing areas in the Ural-Volga region, which accounted for 6.4 per cent of the Union's production in 1939. In the Far East, Russia possesses small fields in the northern part of Sakhalin Island, where Soviet and Japanese installations together extracted about 4,000,000 barrels of oil in 1940. The U.S.S.R. obtained the Galician fields when Poland was partitioned, and later the shale oil production of Estonia.

Soviet oil policy is directed toward two main objectives: an immediate and substantial overall increase in output of petroleum and derived products, and the relocation of producing and refining centers in accordance with strategic principles. The existence of immense reserves of oil in both old and new fields has been proved by an intensive exploration program launched by the Commissariat for Oil Industries.⁷³⁻⁷⁴ Production has not kept pace with discovery, however, the principal deficiencies being skilled technicians and satisfactory machinery. As a result, Russia's output was 220,000,000 barrels in 1940, when the third Five-Year Plan called for 264,000,000. Frequent criticisms in the Russian press indicate that the Kremlin is dissatisfied with present conditions.⁷⁵ Production difficulties have also pre-

64. *Department of State Bulletin*, July 6, 1940, and subsequent issues; W. C. Johnstone, "Export Controls and Far Eastern Policy," *Amerasia*, March 1941, pp. 30-35.

65. I. F. Stone, "Oil is Still Neutral," *The Nation*, March 1, 1941, p. 231.

66. Exports of petroleum products to the U.S.S.R. amounted to 1,065,000 barrels in 1938, 884,000 in 1939, and 1,120,000 in 1940. "Foreign Trade of the United States with the U.S.S.R. in 1940," *Foreign Commerce Weekly*, February 22, 1941, p. 307.

66a. Responsible private sources in London agree that Germany does not profit by these exports. *The Economist*, April 24, 1941, p. 571.

67. Soviet imports of American oil well and refining equipment amounted to \$582,000 in 1938; \$246,000 in 1939; and \$2,731,000 in 1940. "Foreign Trade of the United States with the U.S.S.R.," cited; "Oil Equipment Exports Require Licenses," *World Petroleum*, February 1941, pp. 29-30.

68. C. A. Thomson, "The Mexican Oil Dispute," *Foreign Policy Reports*, August 15, 1938, pp. 122-32.

69. Ruth Sheldon, "What Has Happened to Mexico's Oil?" *Saturday Evening Post*, July 29, 1939, pp. 23 ff.

70. *International Petroleum Trade*, April 30, 1941, pp. 114-15.

71. Michael Joel, "Vigorous Search for Reserves Successful in U.S.S.R.," *Oil and Gas Journal*, December 26, 1940, p. 115.

72. B. Haydon, "Soviet Oil Fields in the Caucasus," *Asia*, March 1941, pp. 132-33.

73-74. Joel, "Vigorous Search for Reserves Successful in U.S.S.R.," cited, pp. 115 ff.; "Russian Oil," *The Economist*, January 13, 1940, p. 48.

75. See e.g., an article from *Pravda*, translated in *International Petroleum Trade*, April 30, 1941, pp. 121-22; *Petroleum Press Service*, October 1940, p. 350; J. Stevens, "Uncensored from Moscow," *New Republic*, June 17, 1940, pp. 820-21.

vented shifting the oil industry centers away from the vulnerable Caucasus area, where over 90 per cent of Russia's oil is now obtained, and toward the interior of the Union. Drilling in the Emba fields north of the Caspian Sea and in the Ural-Volga region has been pushed as rapidly as possible, but with little immediate effect. In the Far East, Sakhalin Island remains the only source of oil, producing 4,000,000 barrels in 1940. There is only one refinery in the Far East, at Khabarovsk, to which two more are to be added.⁷⁶ Military and naval forces must rely on shipments from Central Russia and the United States for most of their needs.

While Soviet oil output has responded slowly to attempts at expansion, consumption continues to rise. To the oil requirements of mechanized Russian agriculture was added in 1938 the consumption of a mobilized and active Red Army. The amount of petroleum which the U.S.S.R. can readily release to Germany is therefore small, although political considerations might lead Stalin to order further reductions in non-military consumption. But, before the oil reaches the Reich, it must be transported 2,500 miles from the Caucasus across eastern Europe. Normally, the oil would move through the Black Sea to Rumanian and Bulgarian ports and thence by rail. Balkan transportation routes are already overtaxed, however. Through transportation by rail across the Ukraine and Poland is possible, although Russian railways have for years been strained to the limit.⁷⁷ A third possible means of transport is by barge to the Baltic through the recently completed Dnieper-Bug Canal. The best evidence indicates that Germany is obtaining from Russia about 7,000,000 barrels of products annually, of which a considerable portion is lubricating oil. As Soviet oil production increases and transportation improves, possibly with the aid of German technicians, the physical limitations on exports will be reduced. In the last analysis, Russian aid to Germany will depend on political considerations. Stalin appears distrustful of Hitler's ultimate aims in Eastern Europe and the Near East, but feels that Russia's military, social and industrial position is not strong enough to make

active opposition advisable at this time.⁷⁸ As long as Moscow adheres to this policy of watching and waiting, Russian oil will flow to Germany in comparatively small amounts.

CONCLUSION

The British Empire and its Allies have access to almost unlimited petroleum resources, but are faced with an increasingly serious problem of transportation. The Axis powers, on the other hand, must not only contend with transport difficulties, but also expand their sources of supply. By successive conquests, they are now in position to strike at two major oil-producing regions—the Near East and the East Indies. Operating from Mediterranean bases, the Nazis may be able to take over the Iraq oil fields intact and, once established in the heart of the Near East, would be well placed for attack on the more valuable fields in Iran and the Persian Gulf. The British navy in the eastern Mediterranean will prevent, however, the exploitation of the Iraq fields, and even if it is eliminated, the lack of transport facilities will limit the amount of oil sent to Axis Europe. Germany must therefore continue for some time to depend on present supplies of crude and synthetic oils, operating close to the margin, and vulnerable to intensive air bombardment which would disrupt communication lines and damage oil plants.

Japan's threat to attack British and Dutch possessions in the East Indies if an oil embargo is applied, is probably more than a gesture. But before the Japanese could draw on the East Indian oil fields, they would have to repair the damage caused by the defending forces and then organize an adequate transport service. Meanwhile, Japan's oil position would become increasingly difficult.

Britain must protect the Near and Far Eastern fields and also supply widely scattered countries. The loss of either petroleum-bearing region would not be disastrous, but if both were to fall into Axis hands, the situation might become desperate. British armies on land may not be able to safeguard the Near Eastern fields, but sea power may possibly protect the East Indies and at the same time assure the transport of oil by tank ship. If it does not, the Allies may soon be faced with a serious oil shortage.

76. K. Barnes, "Soviets Stress Program for Far Eastern Section," *Far Eastern Survey*, July 17, 1940, p. 182.

77. B. C. Hopper, "How Much Can and Will Russia Aid Germany?" *Foreign Affairs*, January 1940, pp. 236-39; "Soviet Transport," *The Economist*, March 9, 1940, pp. 412-13.

78. V. M. Dean, "Russia and the 'New Order' in Europe," *Foreign Policy Reports*, December 15, 1940, pp. 238-40.

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